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# PATENT SPECIFICATION

Application Date: May 23, 1922. No. 14,477 / 22.

202,082

Complete Left: Feb. 21, 1923.

Complete Accepted: Aug. 16, 1923.

## PROVISIONAL SPECIFICATION.

### Improvements in the Method of and Means for Evaporating Blood Serum and other Liquids.

We, MATTHEW WILLIAM MILLS and EDWIN RAMSBOTTOM, British subjects, both of Moss Iron Works, Heywood, in the County of Lancaster, do hereby 5 declare the nature of this invention to be as follows:—

The invention relates to improvements in the method of and means for evaporating blood albumen and other liquids.

10 The albuminous liquid or serum obtained from blood which is to be evaporated is contained within a series of superposed trays and we provide a circulation of hot air between such trays to evaporate the liquid. To obtain such a current of hot air we provide a steam heater through which the air is forced by means of a fan. The air may pass through tubes within the heater in which case the steam 15 is on the outside of the tubes, or a reversal of this arrangement may be used in which the air is in contact with tubes through which steam is being forced. Any suitable arrangement may however 20 be used to heat the current of hot air. The heated air is conducted to the evaporating chamber by a main pipe or trunk having branch pipes. The trays containing the serum are placed in rows, 25

one above the other, with a space of a few inches between each tray. The branch air pipes are provided with nozzles arranged to discharge streams of hot air between the superposed trays. The circulated hot air thus acts against the bottom of one of the trays and on the moisture rising from the liquid contained in the tray below. The moisture laden hot air is finally allowed to escape from the chamber by way of a ventilator preferably placed in the upper part of the chamber. The streams of circulating hot air not only efficiently serve to evaporate the liquid of the blood albumen or serum, but also bleach and 30 improve the product.

35 The essential novelty of the invention is the application of hot air circulated about trays containing the serum or other solution or liquid and we do not confine ourselves precisely to the means for heating the air or obtaining a circulation thereof.

40 Dated the 22nd day of May, 1922.

45 For the Applicants,

50 E. K. DUTTON & Co.,  
Chartered Patent Agents,  
5, John Dalton Street, Manchester.

## COMPLETE SPECIFICATION.

### Improvements in the Method of and Means for Evaporating Blood Serum and other Liquids.

We, MATTHEW WILLIAM MILLS and EDWIN RAMSBOTTOM, British subjects, both of Moss Iron Works, Heywood, in the County of Lancaster, do hereby declare the nature of this invention and in what manner the same is to be 60 performed, to be particularly described

[Price 1/-]

and ascertained in and by the following statement:—

The invention relates to improvements in the method of and means for evaporating blood serum and other liquids and 65 consists in providing for the albuminous liquid or serum a series of superposed

trays and a circulation of hot air between such trays to evaporate the liquid.

We are aware that it is not novel to use a chamber containing superposed trays for drying various materials by means of hot air circulated horizontally through the chamber from air passages into which hot air is forced by a fan, such passages being arranged to communicate with the superposed trays at one end, the air being discharged at the other end of the superposed trays, such hot air acting on the material contained on the trays below and heating the under surface of the trays above. The essential novel feature of our invention is the use of a chamber provided with a series of superposed trays to contain the blood serum, and arranging vertical pipes within the chamber provided with horizontally disposed fine jet nozzles placed below the trays, hot air being discharged through the nozzles to act against the under surface of the trays and upon the contents of the trays beneath the nozzles, the chamber being also provided at the top with ventilators to allow of the escape of the moisture-laden hot air.

The apparatus for use with our invention is illustrated in side view, partly in section, in the accompanying drawing.

In such apparatus to obtain a current of hot air of the requisite temperature we provide a steam heater *a* through which the air is forced by means of a suitable fan contained within the casing *b*. The steam heater illustrated consists of an outer casing or shell *a* into the interior of which steam is admitted through the pipe *c* and discharged therefrom through the pipe *d* with the water of condensation. Within the heater *a* is a series of tubes *e* through which air is forced by the fan, and is heated by the steam surrounding and flowing around the air tubes. This type of heater is not claimed as novel and any suitable means may be used to heat the air. For instance a reversal of the arrangement may be used in which the air is in contact with tubes through which steam is being forced. In connection with the air heating arrangement is a chest or chamber *f*. This chamber may be of any desired size and is provided with a series of superposed open metal trays *g* carried on end supports or shelves *g<sup>1</sup>*. These series of trays are divided by vertical hot air pipes *h* each of such vertical pipes being in communication with

a main pipe *i* which is connected to the heater *a*. The vertical hot air branch pipes are provided with horizontally disposed fine jet nozzles *j*. The trays *g* are disposed with a space of a few inches between each superposed tray. The nozzles of the branch air pipes *h* are arranged to discharge streams of hot air between the superposed trays. The circulated hot air thus acts not only against the bottom of one row of the trays but on the moisture rising from the liquid contained in the trays below. It may not be necessary to pass hot air under the bottom row of trays *g* as that now may obtain sufficient heat by radiation from the main hot air pipe *i*. The moisture-laden hot air is finally allowed to escape from the chamber by way of ventilators or dampers *k* preferably placed in the upper part of the chamber *f*. The main hot air pipe *i* is also provided with a damper *m* and dampers *n* are also provided for each branch pipe *h* to control or regulate any section of trays. The streams of circulating hot air not only efficiently serve to evaporate the liquid of the blood serum but also bleach and improve the product, albumen.

The drawing shows two units or sections of superposed trays, but the chamber *f* may be of any required size and contain any number of units.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In an apparatus for evaporating blood serum and other liquids the provision of a chamber having superposed trays to contain the serum or other liquids and vertical hot air pipes provided with horizontally disposed fine jet nozzles to circulate hot air beneath and above the trays substantially as described and shown.

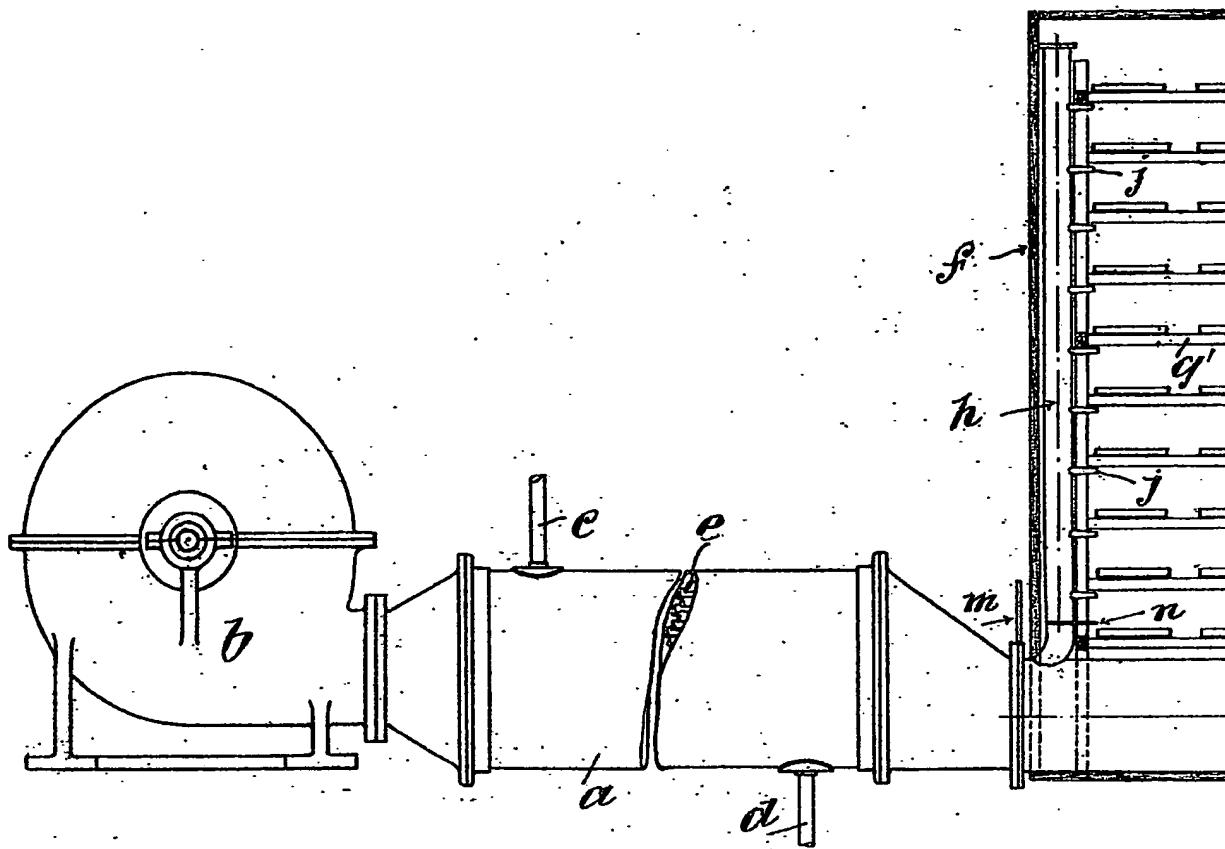
2. The arrangement, construction and combination of parts comprising the apparatus for evaporating blood serum and other liquids substantially as described and as illustrated in the accompanying drawing.

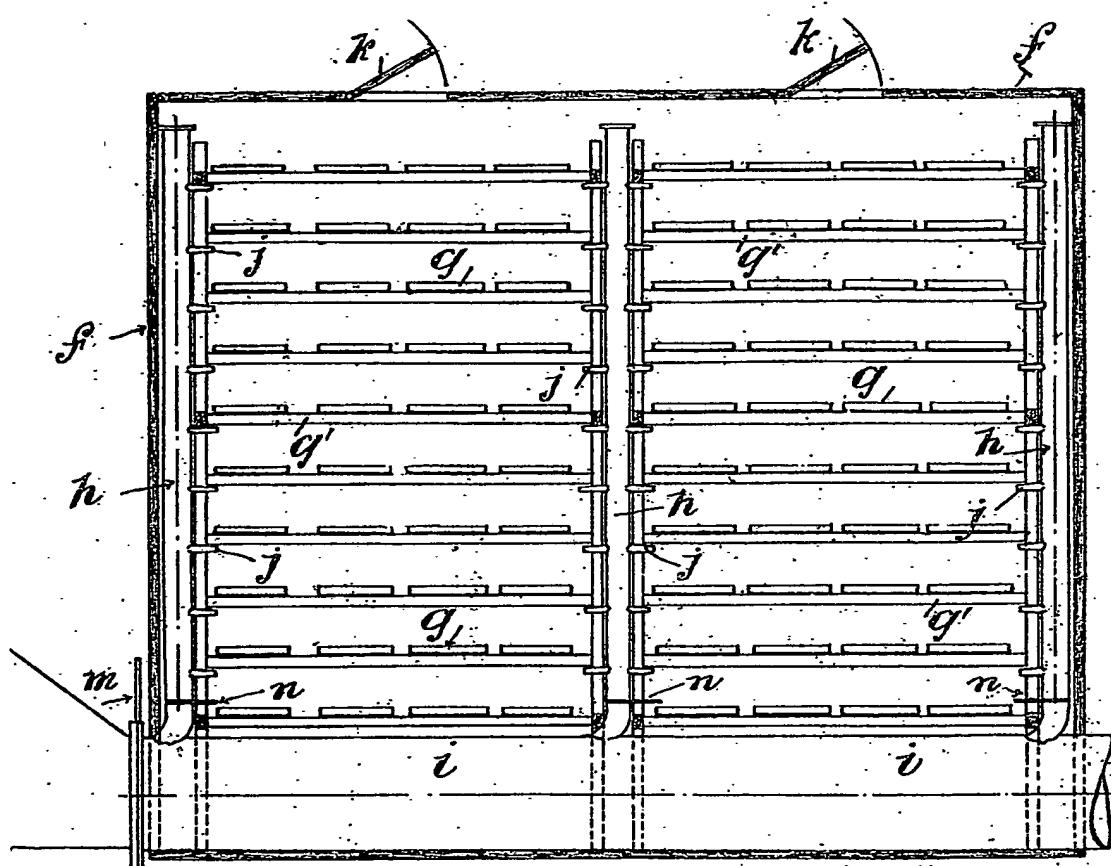
Dated this 20th day of February, 1923.

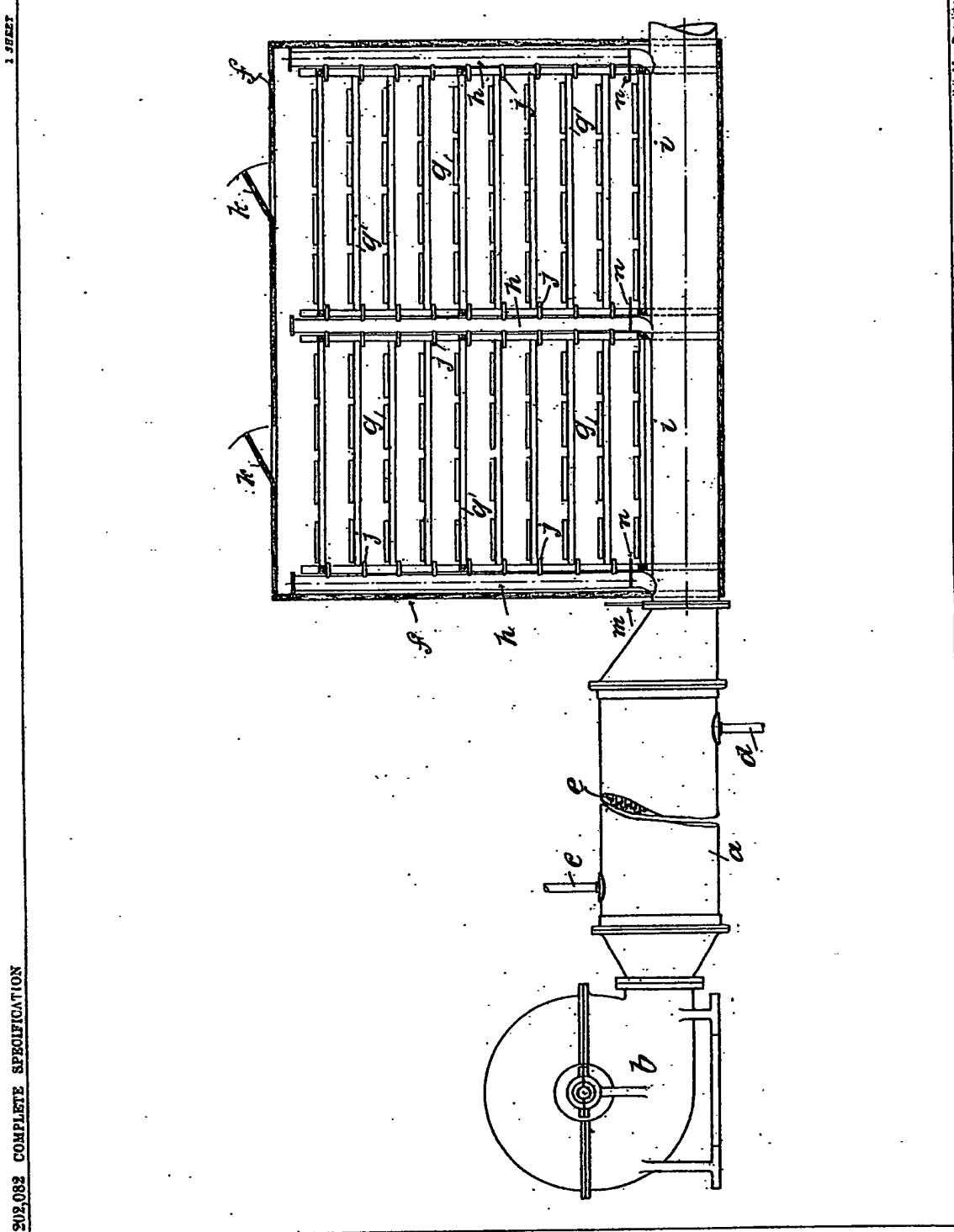
For the Applicants,

E. K. DUTTON & Co.,  
Chartered Patent Agents,  
5, John Dalton Street, Manchester.

[This Drawing is a reproduction of the Original on a reduced scale.]







[This Drawing is a reproduction of the Original on a reduced scale]